



Characterizing Beauty Salon Wastewater for the Purpose of Regulating Onsite Disposal Systems



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INTRODUCTION

There are many beauty salons in New Jersey located in areas not served by sanitary sewers. Salons in these areas discharge their liquid wastes into septic systems and/or other types of subsurface disposal systems. Prior to 1992, little information existed regarding the potential risk associated with the wastewater these salons generate. In 1992, New Jersey Department of Environmental Protection (Department) enforcement personnel initiated a program to sample eight beauty salons, for the purpose of determining the characteristics of the liquid wastes generated by those facilities and to provide a basis for regulating them appropriately. This document presents the findings from that study, and concludes with a summary of the policy for regulating beauty salons in New Jersey. It is reasonable to believe that the results of this study could apply to beauty salons in other States.

METHODS

Wastewater and sludge samples were collected from the septic tanks at beauty salons around the state of New Jersey. The samples from eight salons were analyzed for a suite of chemical parameters of concern. Samples were collected in accordance with the New Jersey Department of Environmental Protection Field Sampling Procedures Manual. Wastewater and sludge samples were analyzed by New Jersey Certified Laboratories using standard EPA methods applicable to the characteristics of the samples.

REVIEW OF DATA

Review of the data indicates that sludge and wastewater effluent do not generally contain contaminants (Table 1) that exceed the New Jersey ground water quality standards (GWQS). Only a few parameters of concern did exceed the GWQS in the wastewater or sludge, and this did not occur on average. The parameters where the maximum value did exceed the GWQS included cadmium, lead, sodium, chloroform, dimethyl phthalate, bis(2-ethylhexyl) phthalate, and ammonia-nitrogen. The exceedances represent the highest levels recorded for the 8 facilities and should not be construed to be an average value. The highest levels are reported simply because they represent the most conservative consideration of the data with respect to its maximum potential to impact the environment. Final treatment in the soil after the effluent leaves the septic tank is expected to be sufficient to attenuate the parameters of concern prior to entering the groundwater.

Review of Material Safety Data Sheets (M.S.D.S.) from various beauty salon supply companies determine that most constituents of beauty salon supplies are non-hazardous, non-toxic and biodegradable. Of those materials which identified hazardous materials, most included hair dyes, bleaches, and permanent hair treatment products.

DISCUSSION

In order to provide a basis for determining the optimum way to regulate beauty salons, the Department considered the potential impacts of the discharges on the environment and on ground water quality. Because actual research data concerning the effects of beauty salon wastewater on ground water quality is limited,

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the Department researched relevant EPA studies to determine potential ground water quality impacts. The following sections discuss the types and relevance of the possible pollutants.

Cadmium and lead are heavy metals. These metals are a health and an environmental concern due to their potential to accumulate in the food chain and enter ground water. However, according to the referenced EPA Process Design Manual, Land Treatment of Municipal Wastewater, these metals accumulate near the soil surface and decrease with depth due to adsorption to soil particles. Adsorption occurs on surfaces of clay minerals, hydrous oxides or iron and aluminum, and organic matter. The wastewater cadmium levels described in the EPA reports were four times the concentrations found in the beauty salon waste. EPA reported that 91.2% of the cadmium concentrations were adsorbed in the soil. The research data was generated from slow rate (SR) wastewater disposal sites. Soil absorption systems are characteristic of a slow rate wastewater disposal design process. According to EPA, cadmium and lead were absent in the percolate at five of the six SR sites and concentrations of the metals have not approached toxic levels in any of the sites studied after fifty years of operation. In addition, based upon sludge analysis of the beauty salon waste, it is evident that these metals are most concentrated in residual materials rather than the wastewater. Therefore, it is not likely that high levels of heavy metals will occur at all, and when they do, they are not likely to enter the ground water, since they will be attenuated by the soil.

Beauty salons which discharge to sandy soils may be a concern for potential impacts of heavy metal concentrations on ground water quality because sandy soils have less adsorption capacity than fine textured and organic soils. However, even data derived from a Rapid Infiltration wastewater disposal systems studied by EPA which was located in permeable sandy soils showed that very little leaching of trace elements occurred in the system they studied during its thirty-three years of operation.

Sodium is characterized as a secondary parameter and usually is a concern for crop growth or for its ability to effect potable water. Because the beauty salon wastewater sodium concentrations are characteristic of septic effluent and pose no threat to human health or the environment, sodium from beauty salons is not a parameter of concern.

Chloroform is a volatile organic compound. EPA has shown through an overland flow pilot system that chloroform, when land applied as high as 17.8 ug/l, had a 98.3 % removal due to volatilization and sorption near the soil surface followed by biodegradation or volatilization in the soil medium. Overall, volatile organic compounds have an average removal of 96% as demonstrated by the two other EPA research sites. EPA states "Based upon the results of these studies, it does not appear that normal concentrations of trace organics in applied wastewaters would cause problem levels in ground waters underlying slow rate or rapid infiltration sites". Considering the results of the EPA studies, the low levels of chloroform and other VOCs in the salon wastewater are not considered to be a threat to ground water quality.

Dimethyl phthalates and bis(2-ethylhexyl)phthalate are classified as base neutral compounds. According to EPA, Water-Related Environmental Fate of 129 Priority Pollutants, research has shown that phthalate esters are biodegraded in soil. Degradation was due to enzymatic action of microorganisms and optimal degradation rates were based on aerobic conditions as well as optimal soil temperatures and pH levels. The Department believes that the aerobic zone of four feet that exists beneath a septic system leachfield will provide adequate degradation of these pollutants.

Ammonia-nitrogen is a nutrient. The levels found in the beauty salon waste are similar to the characteristics of domestic septic system wastewater and, therefore, ammonia is not considered a parameter of concern for human health or the environment when systems are sized and situated properly.

CONCLUSIONS

Review of the data from the beauty salon facilities in the study group indicates that the liquid waste can be characterized as only slightly more “industrial strength” than typical domestic waste. Beauty salon owners should be encouraged to use only non-hazardous, non-toxic substances, and to avoid the use of hair dyes, bleaches, and perms when the discharge enters an onsite disposal system such as a septic system. The product industries should strive to produce products that are not considered hazardous, since salon owners will then be able to gain approvals for septic systems with much less difficulty. The analyses suggest that individual state or general permits with quarterly or semi-annual sampling for VOC's would be unduly burdensome for the operators considering the relatively innocuous characteristics of the waste. Therefore, the Department modified its onsite sewage disposal regulations to authorize beauty salons as standard septic systems approved by local health department authorities. To effectuate this approach, flow criteria were provided in the New Jersey Onsite Wastewater Treatment Regulations (N.J.A.C. 7:9A-7.4) for 120 gallons per day per sink. Using this criteria, saloons with more than 15 sinks will exceed the flow volume threshold that requires them to obtain a New Jersey state discharge to ground water permit with monitoring requirements. Therefore, small facilities will be approved by local health departments, and large systems will need to obtain state permits.

Beauty salon owners should be encouraged to use only non-hazardous, non-toxic substances, and to avoid the use of hair dyes, bleaches, and perms when the discharge enters an onsite disposal system such as a septic system. The product industries should strive to produce products that are not considered hazardous, since salon owners will then be able to gain approvals for septic systems with much less difficulty.

On a cautionary note, engineers who design onsite disposal systems for beauty salons should be aware that the solids and carbon content of the wastewater may be quite different from that of typical domestic septic system waste. Typically, the wastewater is low in solids and carbon content, and standard expectations for septic tank treatment may be inappropriate. Consequently, the system designs may need to be modified accordingly.

REFERENCES

- EPA, Process Design Manual, Land Treatment of Municipal Waste, EPA 625/1-81-013.
- EPA, Design Manual, Onsite Wastewater Treatment and Disposal Systems, EPA 625/1-80-012
- EPA, Water-Related Environmental Fate of 129 Priority Pollutants. Volume I: Introduction and Technical Background, Metals and Inorganics, Pesticides and PCBs. EPA 440/4-79-029a
- EPA, Water-Related Environmental Fate of 129 Priority Pollutants. Volume II. EPA 440/4-79-029b.

Table 1. Summary results of wastewater³ and sludge⁴ from New Jersey beauty salons.

PARAMETER	HIGHEST VALUE (8 facilities) mg/L	New Jersey GWQS N.J.A.C. 7:9-6 mg/L
Aluminum	133	200
Antimony		20
Arsenic	5	8
Barium	38	2000
Calcium	3800	NA
Cadmium	10	4
Chromium	10	100
Copper	854	1000
Iron	204	300
Lead	29	10
Magnesium	1200	NA
Manganese	10	50
Nickel	100	100
Potassium	9900	NA
Selenium		50
Silver	723	NA
Sodium	75000	50000
Tin		NA
Zinc	632	5000
Chloroform	36	6
Toluene	110	1000
Antracene	6	2000
PHENOL	57	4000
Dimethyl Phtalate	11	10
Fluoranthene	20	300
Pyrene	15	200
Benzylbutylphthalate	140	
DI-N-Octyl Phthalate	17	NA
DIETHYL PHTHALATE	287	5000
BIS(2-ETHYLHEXYL)PHTHALATE	330	30
NITROPHENOL-4	37	NA
Phenanthrene	34	NA
AMMONIA-N	29000	500
NITRATE/NITRITE N	400	10000
TOTAL ORGANIC CARBON	58300	NA
CHLORIDE	100000	250000
OIL AND GREASE	60000	NONE
Sulphate	33000	250000

³ Data collected by NJDEP Enforcement, as indicated in Table 2.

⁴ Sludges tend to have much higher concentrations of many of the pollutants

Table 2. Site and Sample Data Associated with the New Jersey Beauty Salon Study

Sample Date	Facility Type	Sample Type:
NA	Strip Mall	Salon waste plus strip mall wastewater
8/26/92	Strip Mall	Salon waste plus mall wastewater; Wastewater and sludge were analyzed
9/17/92	Individual Unit	Wastewater from holding tank
NA	Individual Unit	Wastewater from holding tank
8/18/92	Individual Unit	Segregated Salon & Toilet Waste
8/11/92	Individual Unit	Segregated Salon Waste & Toilet Wastewater and sludge analyzed
8/24/92	Individual Unit	Segregated Salon & Toilet Waste
8/25/92	Individual Unit	Segregated Salon & Toilet Waste